NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

WATERSPREADING

(Acre)

CODE 640

DEFINITION

Diverting or collecting runoff from natural channels, gullies, or streams with a system of dams, dikes, ditches, or other means, and spreading it over relatively flat areas.

SCOPE

Waterspreading systems are suited to locations where the topography and climatic conditions are such that the additional moisture can be expected to improve plant growth. Areas that have an average annual precipitation of 8 to 25 inches benefit from waterspreading. Waterspreading differs from irrigation in that applications are timed by the availability of natural runoff flow rather than scheduled to meet plant needs. This standard does not apply to Surface and Subsurface Irrigation Systems (443).

PURPOSE

To supplement natural precipitation in areas where plants can effectively use additional moisture.

CONDITIONS WHERE PRACTICE APPLIES

Waterspreading systems apply to areas where:

1. Soils have suitable intake rates and adequate water-holding capacities for the crops to be grown.
2. Soils are suitable for production of feed, forage, or grain crops.
3. The topography is suitable for the diversion or collection and spreading of water to achieve the desired result.
4. Runoff or streamflow is available at the time of the year and in a volume sufficient to increase plant growth.
5. Flows can be collected or diverted and spread and exceed water returned without causing excessive erosion.
6. Fish and wildlife will not be significantly affected adversely.
7. Grazing of the spreading area can be controlled.

PLANNING CONSIDERATIONS

1. Consider nonstructural measures, including brush removal, fencing, and seeding, before planning a waterspreading system.

2. Do not install a waterspreading system on highly erodible soils or in areas where the hazard of erosion is high.

3. Include erosion control at the diversion works, within the spreading area, and at the outlet facilities as an integral part of the waterspreading system.

4. Manage livestock use of the spreading areas to prevent compaction when soils are wet and to prevent range degradation by overuse.

Water Quantity

1. Significant reduction of surface water quantity. Factors include the volume of water diverted, and volume of return flows.

2. Potential increase in soil moisture and ground water quantity. Assess additional surface area covered by diverted water, soil infiltration rates, diverted flow time, and evapotranspiration volume.

Water Quality

1. The reduction in sediment and adsorbed and dissolved nutrients and pesticides in surface waters. Consider soluble chemicals infiltrating in the water spread areas, the percentage of fine soil practices in the suspended sediment, and the amount of soil disturbance during construction.

2. Degradation of return flows by chemicals transported from the spreading area. Consider rate and volume of return flows, chemicals used, time of chemical application in comparison to predictable storm events, and the nature of sediments transported.

3. Potential ground water degradation from applied chemicals caused by increased infiltration. Important factors include available soil moisture storage, evapotranspiration, type and amounts of chemicals used, and saline geology.

4. Potential visual impacts of decrease sediment in return flows and the lack of streamflow below the water spreading area.

DESIGN CRITERIA

Drainage area. The contributing area, or ratio of watershed area to benefited area for a “dependable” water supply, must be such that the volume of divertable flow needed for the design water application can be expected on an average of 8 years in 10. Systems with less than this amount, classed as “questionable,” must necessarily be simple and inexpensive and must furnish at least the volume that can be expected 1 year in 2.

Diversion works. The diversion works should be automatic, requiring no manual control to divert the stream onto the spreading areas, except on watercourses that have expected flow durations of more than 24 hours. The diversion must be capable of safely bypassing the peak flood flow. Suitable controls should be provided so that only the desired rate of flow enters the conveyance system. Where significant sediment is present in flood flows, a low-flow bypass must be installed to exclude bedload from the system. The inlet control must be adjustable to exclude flow from the spreading areas when crops are to be harvested mechanically. The diverted flow must not cause undue maintenance problems in the diversion works or the spreading area.

Conveyance system. The conveyance system shall have the capacity to safely convey the design flow from the diversion works to the spreading area.

Spreading area. Ditches, dikes, diversion, conduits, and similar structures will be arranged and located to spread diffused flow over the land surface or to pond water over the land, depending on the type of system selected. All slopes will be stable and graded to the slope necessary for management and harvesting operation. Land leveling, land forming, land smoothing, obstruction removal, and similar practices may be performed for more uniform distribution of water and increased operation efficiency. All component practices installed as part of the overall system will comply with the SCS standard for that practices.

If the water is to be spread over the area as diffused flow, the depth of application should be the approximate depth of water that the soil will absorb in the period equal to the estimated flow duration. For soils that have rapid or very rapid permeability, this depth may be more than is needed to fill that root zone.

If the water is to be impounded on the spreading area, the depth of application should approximately equal the available moisture capacity of the soil profile for the effective root zone of the plants to be grown. Rapidly permeable soils are generally unsatisfactory for impoundment systems. The system should be designed and managed to minimize deep percolation.

Water impounding dike. The maximum depth of water impounded against dikes will be 3 ft except across channels, sloughs, swales, or gullies less than 40 ft wide, where up to 5 ft of depth will be allowed. Water depth greater than this requires embankment design according to the standard for Ponds (378).

Minimum top width of dikes at design top elevation will be 3 ft. Side slopes of dikes will not be steeper than two horizontal to one vertical. They should be flatter as needed for stability and for mowing or operating other farm equipment.

The foundation of all dikes must be stripped of vegetation or other unsuitable material before placement of fill material. A cutoff will be installed when necessary for stability or to prevent seepage. The dike must be constructed high enough to allow at least 5% for settlement.

Outlet works. A provision must be made for returning excess water from the system to the stream channel or other parts of the system without causing excessive erosion and in time to prevent crop damage by ponded water. The flow line of gated conduits used for this purpose should be below ground level to improve flow characteristics.

Dikes with a total water storage capacity less than the 10-year, 24-hour runoff volume from the contributing area must have at least one outlet or treating area must have at least one outlet or overflow section that is at least 1.0 ft below the design top elevation. This may be a vegetated spillway, stable rock, weir overflow structure, pipe outlet, or some combination of these. Total capacity of the outlet must exceed the design inflow to the impoundment with a freeboard of not less than 0.3 ft. The design inflow is the maximum diverted rate of flow, or the 10-year, 24-hour peak flow from the contributing area, whichever is less.

PLANS AND SPECIFICATIONS

Plans and specifications for waterspreading shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.